OUR ASTRONOMICAL COLUMN.

THE RED SPOT ON JUPITER.—This object exhibited a slackening motion during the years from 1878 to 1900. It then became decidedly accelerated, so that the rotation period, which in 1899 and 1900 was 9h. 55m. 41·7s., decreased in 1901 to 9h. 55m. 40·6s., and in 1902 to 9h. 55m. 39·0s. In 1903 the spot again became retarded, and the rotation period increased to 9h. 55m. 41·0s. This retardation has now in turn given way to another acceleration of speed. In January last the longitude of the spot was 35°, whereas at the present time it is only 30°, so that the rotation period during the first six months of 1904 has been about 9h. 55m. 39·5s. It is difficult to explain these curious oscillations in velocity. Some extensive disturbances have, however, affected the south temperate region of the planet in recent years, and a large dusky patch has been visible since 1901 rotating with a rate of 9h. 55m. 18·7s., or about 22 seconds less than that of the red spot. The motion of the latter may possibly have been affected by disturbances occurring in the same latitude, but this can only be fully determined by further observations. In the meantime, both the red spot and the south temperate spot are being attentively watched as to their motions and appearances. The two objects were in conjunction in July, 1902, and June, 1904, and in the spring of 1906 the event will be repeated if the south temperate spot should remain visible until that time. As to the red spot and its surroundings, they appear to form features of remarkable permanency, and are likely to continue perceptible for an indefinite period.

VARIABLE RADIAL VELOCITY OF α ANDROMEDÆ AND FOUR OTHER STARS.—Whilst engaged in line-of-sight work with the Lowell spectrograph Mr. V. M. Slipher discovered the variable radial velocities of α Andromedæ, α Libræ, σ Scorpii, X Sagittarii, and ε Capricorni.

The velocities of α Andromedæ were obtained from measurements of the Hγ and 4481 magnesium lines, the helium 4472 line also being measurable. They range from +20 (February 11) to −45 km. (March 4), but are uncertain to a few kilometres. The observations indicate a period of about 100 days and a very eccentric orbit.

The measurements of the α Libræ spectrograms give a range between −60 km. on May 24 and +20 km. on July 6, and suggest that both components are bright. The velocities of σ Scorpii range between +25 (June 25) and −25 km. (June 18). Only two plates were measured for X Sagittarii, which is a visual variable having a period of seven days, and these gave +1 and −22 km. on June 19 and 22 respectively. A range of from −45 km. (September 7, 1903) to +6 km. (July 6) was obtained for the radial velocity of ε Capricorni (Lowell Observatory *Bulletin*, No. 11).

VARIOUS CLASSES OF SILICIUM LINES AND THEIR OCCURRENCE IN STELLAR SPECTRA.—In a communication to l'Académie des Sciences (Paris), M. de Gramont describes some results he has obtained during a series of experiments on the effects of various amounts of self-induction in the spark spectrum of silicium. His observations led him to form two main classes of silicium lines:—(1) those which are not affected or are strengthened by self-induction amounting to 0·03 henry; (2) those of which the intensities are reduced by self-induction and which disappear entirely with 0·006 henry.

He further divides them into eight groups (α–η), and, in a table showing their individual characteristics in the spark and in various stellar spectra, he shows their connections with the four temperature groups (silicium i.–iv.) named by Sir Norman Lockyer in his temperature classification of the stars. From this table he draws the following conclusions:—(1) Only the spectra of the first class, *i.e.* hydrogen and helium stars, show the lines which disappear under the action of self-induction, those of helium, *e.g.* the Orion stars, exhibiting as strong lines those which are first to disappear (Lockyer's silicium iii.), whilst the hydrogen stars, *e.g.* Sirius, present the lines which are the last to disappear (silicium ii.). Stellar spectra of the second class (solar type) and the "flash spectrum" contain the lines which appear in both arc and spark, and resist self-induction, *e.g.* λ 3905·7 (silicium i.). As the lines belonging to Sir Norman Lockyer's group iv. are near oxygen and nitrogen lines, and always disappeared from the spectra with the air lines, and as oxygen and nitrogen have been shown to exist in the absorbing atmospheres of the stars the spectra of which show this group (*e.g.* β Crucis), M. Gramont suggests that these lines are attributable to air (*Comptes rendus*, No. 3, vol. cxxxix.).

LINE OF SIGHT CONSTANTS FOR SOME ORION TYPE STARS.—In No. 3, vol. xix., of the *Astrophysical Journal*, Miss E. E. Dobbin gives a list of line-of-sight constants for 112 stars of the Orion type, computed for the reduction of the Bruce spectrograph observations.

Dr. Schlesinger's formulæ, as employed in his "Line-of-Sight Constants for the Principal Stars," were used, and the name, magnitude, position, and constants are given for each star. The longitude is given for 1900, and therefore requires the 50″ precession correction for each year since then.

THE TAILS OF BORRELLY'S COMET (1903) AND LIGHT-PRESSURE.—Mr. S. A. Mitchell, of Columbia University, has calculated the value of the repulsive force due to light-pressure which acted on the several tails of Borrelly's comet. Using the values for the angle between the radius vector of the comet's path and the tail, as determined by Prof. Albrecht, he found somewhat discordant values for the principal tail, which gave, in the mean, the value for the light pressure as 18·47 times gravity. For the secondary tail the values were much more consistent, and gave a mean of 1·824 times gravity; the last four lines given in this table, which were derived from measures of the angle on August 13, 14, 15, and 18, give a mean for the repulsive force of 1·460 times gravity, and therefore appear to indicate the existence of a third tail, which the photographs obtained on August 12 and 15 corroborated.

In a second table Mr. Mitchell compares the values of the angles between the tails and the radii vectores as obtained (1) by calculation from the repulsive forces given above, (2) by direct measurement. The results agree fairly well considering the uncertainty of the measures of such ill-defined objects as the tails. The differences between the observed and calculated values for the principal tail as the comet approached the sun indicate the presence of some other repulsive force in addition to that caused by light pressure, and Mr. Mitchell believes that part of this, at least, is real. The size of the particles forming each of the three tails, as determined from the above repulsive forces, was 0·1μ, μ, and 1·33μ respectively (*Astrophysical Journal*, No. 1, vol. xx.).

SURVEY OF INDIA, 1901–2.—A volume of "Extracts from Narrative Reports of the Survey of India, 1901–2," published at Calcutta (1904), contains accounts of the work done by several parties of surveyors in connection with the triangulation of Upper Burma, latitude operations, the magnetic survey of India, tidal and levelling operations, and the topography of Upper Burma, Sind, and the Punjab.

During the latitude operations some puzzling anomalies were discovered between the observed and calculated values, the difference O–C preserving its positive character to a point much further north than might be expected.

The latitude results obtained, using stars from Newcomb's catalogue and from the Greenwich ten-year catalogue for 1880, show the same probable errors, but there is a noteworthy consistency of sign and amount (about +0·3″) in the value Newcomb-Greenwich.

An interesting account of the practical details of the magnetic survey, and of the instrumental equipments at Dehra Dun, Kodaikanal, Calcutta, and Rangoon are given in part iii., where the principles of several new and modified instruments are also fully described.

THE BRITISH MEDICAL ASSOCIATION IN OXFORD.

THE seventy-second annual meeting of the British Medical Association, which was held in Oxford last week (July 26 to 29), was beyond question one of the most successful meetings in the memory of members of the association, as it was in point of numbers much the largest yet recorded.

It was remarkable also for the persistence and enthusiasm with which, in spite of all the counter-attractions of that ancient and glorious seat of learning, and of the diversions, entertainments, and receptions arranged both by the

members of the university and by the citizens, a quite unusually large proportion of the members who were visiting Oxford steadily pursued the actual business of the meeting in the various sections.

Not only was the occasion distinguished by the presence and participation in the sectional meetings of a considerable number of eminent foreign visitors, and of an exceptionally numerous gathering of the recognised leaders of thought and investigation in medical science in our own country and the colonies, but it was also rendered memorable by the great importance and originality of the new work brought forward in many of the sections. Indeed, both in the science and the art of medicine in its widest sense, notable results of signal interest were recorded; and more than one sectional meeting witnessed the initiation of far-reaching advances, the significance of which it would be difficult to overestimate.

An academic interest was lent to the occasion by the presence of the Vice-Chancellor at a number of the meetings, and by the holding of a special convocation of the university, at which the doctorate in science, *honoris causa*, was conferred upon the following distinguished members of the association :—

Dr. T. Clifford Allbutt, F.R.S., regius professor of physic in the University of Cambridge; Mr. Andrew Clark, chairman of council, British Medical Association; Dr. T. D. Griffiths, late president of the British Medical Association; Mr. Jonathan Hutchinson, F.R.S., late president of the Royal College of Surgeons of England; Sir William Macewen, F.R.S., regius professor of surgery in the University of Glasgow; Sir Patrick Manson, F.R.S., of the London School of Tropical Medicine; Sir John W. Moore, formerly president of the Royal College of Physicians of Ireland; Prof. Osler, of Johns Hopkins University.

At the annual general meeting of the association the Vice-Chancellor of the university, Dr. Monro; the Dean of Christ Church, the Very Rev. T. B. Strong; the master of University College, Dr. Bright; and Mr. A. G. Vernon Harcourt, F.R.S., of Christ Church, were elected honorary members of the association.

The president, Dr. William Collier, took as the subject of his address "The Growth and Development of the Oxford Medical School." Starting from the period when the study of science and medicine in Oxford was at such an ebb that the school had been justly spoken of as "a lost medical school," he showed how large a part the association had played in its re-establishment.

By the action which it took in 1879 in memorialising the House of Commons, the university commissioners, and the hebdomadal council, it had afforded most material assistance to the late Sir Henry Acland and his colleagues at a critical period in the struggle which they were carrying on in Oxford. The work of Acland had been nobly carried on by his successors. Under their guidance there had gradually again grown up in Oxford a school of natural science and medicine which was already taking a prominent place among the leading schools of science in the country.

After emphasising the advantages which had thus accrued both to the profession of medicine and to the university, Dr. Collier drew a vivid picture of the brilliant past of Oxford medicine at the time when, in the sixteenth and seventeeth centuries, the university formed the centre of English scientific thought, and numbered on her roll such names as those of Willis, Boyle, Wilkins, Lower, Wren, and Harvey. To-day, he said, Oxford was again alive to the importance of science and the scientific method. Nothing save the bitter need for necessary endowments hampered her and held her back from bearing once again a noble part in the advancement of natural knowledge, and rivalling the scientific glories of her past.

Continuing, Dr. Collier said we all of us realised that the provision which has to be made for a modern scientific education is of necessity a costly undertaking. He wished more particularly to emphasise this point, because the amount of work done in the way of instruction in the scientific departments of the university for a totally inadequate remuneration was well recognised and much deplored. He would quote the words spoken recently by His Majesty the King at Cambridge :—"the older universities must receive new endowments, if education within my realms is to be kept at its proper standard of efficiency."

One could but hope that these new endowments of which the university stood in such urgent need would speedily be forthcoming; and one found a difficulty in understanding how it was that a university such as that of Oxford, with its noble traditions and its long roll of illustrious dead—a university which for many centuries had been, with the sister University of Cambridge, the acknowledged training school of the leaders of thought and action in the country—failed to appeal to those fortunate individuals who were in a position to do their country and education a service, and to enrol their names on that imperishable record of benefactors whose memories we honour and extol.

The addresses in medicine and surgery delivered by Sir William Selby Church and Sir William Macewen were of great importance, and a valuable popular lecture on disease germs, open to the public, was delivered by Dr. Bagot Ferguson.

Sir William Church dealt with the relation of medicine to the State, and with the pressing questions in public health. The national health, he urged, was a matter "of supreme importance far transcending the ordinary political issues of the day." But at the present time the administration, even of the Acts which had been secured, was ineffective.

He was afraid, from the nature of the report of the Treasury Committee appointed to consider the position and duties of the Board of Trade and the Local Government Board, that there was not much prospect of the Public Health Department of the Board receiving any increase either of power or payment. The health of the nation, on which its success and prosperity depend, was thrust into the background with the remark that the president of the board "has the advantage not only of the professional opinion of the Medical Officer of the Board, but also of the general administrative experience of the Permanent Secretary."

He thought that in pressing the necessity for the reform of the Local Government Board upon the attention of the president and the Government, three points should be especially emphasised :—first, that the central authority should act as an advisory as well as a supervising authority; secondly, that both in the Local Government Board and in the local authorities the medical element should have greater weight; and, thirdly, that the medical officers of these authorities should exercise further supervision and control over the purity and wholesomeness of articles sold for food.

In the section of anatomy Prof. D. J. Cunningham introduced a discussion upon giants and dwarfs. He regarded gigantism and acromegaly as morbid processes having many points of similarity, and stated that of the cases of gigantism on record thirteen were certainly acromegalic. Dr. Gibson and Prof. Symington also supported the view that gigantism is a pathological condition, and is associated with disease or abnormality of the pituitary body. Dr. Hastings Gilford held that giants and dwarfs may be either natural or pathological. He described three forms of dwarfism, which he illustrated by a number of living cases. He also exhibited a beautiful series of photographs bearing on atcleiosis and progeria.

In connection with this section Dr. Keith exhibited a series of hearts to demonstrate the arrangement of the auricular musculature forming the valves described by him as closing the venous orifices during normal auricular contraction. The observations which he has made have also led to the elucidation of the mechanism by which the right crus of the diaphragm, acting upon the heart, produces what is termed by physiologists "the respiratory pump." They also explain the means by which a number of the changes in the circulation taking place at birth are brought about.

Dr. Keith also had specimens proving the existence of a sphincter muscle at the ileo-cæcal valve in man.

Dr. Keibel, of Leipzig, showed an instructive series of models of the development of the urogenital system of Echidna, and Dr. Bryce detailed his observations into the origin of embryonic leucocytes, derived from a study of the histogenesis of the blood of larvæ lepidosiren.

The section of physiology held a discussion on the thalamic region in conjunction with the anatomists. The discussion was opened by Dr. Gustav Mann, who divided the central nervous system into an anterior part limited

behind by the posterior commissure, and a posterior portion which he termed collectively the cord. He described several new nuclei in the thalamus, and illustrated his conclusions by a series of models, microscopic sections, and stereoscopic photographs of the thalamus in monkeys and rabbits.

Sir Victor Horsley dwelt on the necessity for making both horizontal and sagittal sections of the thalamus, and for directing attention to cell-systems rather than to tracts of fibres. The current system of dividing the thalamus into tracts of fibres is quite untrustworthy unless checked by the degeneration method. His excitation experiments, so far as they had gone, confirmed Dr. Mann's results.

Dr. F. Griffiths and Dr. W. B. Warrington read an interesting paper on the varieties of the cells of the spinal ganglia and their relationship to axons of different distribution, and showed a useful series of illustrative microscopical sections.

Among many other valuable papers and discussions may be mentioned the important debate on chloroform anæsthesia and the demonstration given by Mr. Vernon Harcourt of his apparatus for the administration of known percentages of chloroform vapour. The apparatus is convenient and compact, and guarantees that the amount of chloroform administered is never in excess of 2 per cent. of the inspired air. An apparatus of a similar purpose by Dubois was also shown by Dr. Chapman.

In the section of pathology an unusual amount of valuable new work was published. The discussion on immunity was opened by the president, Dr. Ritchie, who began by pointing out what definite conclusions were now firmly established, and what were the problems which awaited solution. He then discussed the relation of the processes concerned in the immunity reaction to normal physiological events, and the general bearing on the question of the more important recent work. Dr. Bulloch followed, dealing in a masterly fashion with the cellular aspects of the problem of immunity, and Dr. Dreyer, of Copenhagen, read an important paper on agglutinins.

Dr. Madsen, of Copenhagen, then described the steps by which, in association with Prof. Arrhenius, he had shown that the relation of toxin and antitoxin in the living body, exemplified in what is known as "Ehrlich's phenomenon," cannot be explained, as Ehrlich holds, as being due to the presence of degenerated toxins in the crude bouillon from diphtheria or tetanus cultures. While not denying the existence of such degenerated toxins in the bouillon cultures, they maintain that the phenomenon is due to the fact that toxin possesses only a weak affinity for its corresponding antitoxin. It thus results that dissociation phenomena occur between the toxin, antitoxin, and the toxin-antitoxin molecules. In support of this view new evidence was submitted from investigations carried out upon ricin and anti-ricin, snake venom and antivenene, and saponin and its anti-body, cholesterin.

Further contributions to the study of snake venoms were communicated by Dr. C. J. Martin and Dr. Noguchi.

Dr. Wright described the experiments which led to his discovery of the bodies which he terms opsinines. These bodies have the property of enabling phagocytes to attack bacteria. They are present in the blood serum, but not in the phagocytes themselves, and they can, like anti-bodies, be transferred to foreign phagocytes, upon which they then confer a like bacteriolytic power.

At a later period of the meeting Dr. Wright gave a most lucid demonstration of the numerous brilliant modifications and new methods which he has introduced, and which have simplified and much increased the accuracy of all kinds of blood investigation and research into the mechanism of bacteriolysis.

A discussion was also held upon the *rôle* of the lymphocyte. This was opened by Dr. Lovell Gulland and Prof. Muir, and many valuable communications were contributed, notably a paper by Dr. Beattie, of Edinburgh, in which he concluded in favour of the endothelial origin of many of the mononuclear cells in inflammation. The discussion revealed the fact that a considerably greater uniformity of opinion as to the origin of the various kinds of leucocytes is coming into existence among pathologists.

The subject of the third discussion was the chemical pathology of gout. This was opened with a most able paper from Prof. von Noorden, and in the course of the discussion Dr. Walker Hall gave a demonstration of his simple apparatus for the rapid determination of the urinary purins.

In the section of tropical diseases Colonel Bruce opened the discussion on trypanosomiasis with a suggestive paper, in the course of which he stated that trypanosomal fever is in all probability the first stage of sleeping sickness, and that the *Glossina palpalis* is the medium of transmission.

A discussion was also held on the significance of the Leishman-Donovan bodies. This was introduced by Major Leishman, who pointed out the occurrence of these bodies in kala-azar, and maintained that they probably represent a stage in the life-history of a flagellate organism closely resembling a trypanosome. Dr. G. C. Low exhibited sections of the spleen from a case of kala-azar, showing these bodies *in situ*. He also exhibited a number of specimens showing the perivascular infiltration in the brain and cord in sleeping sickness.

Very instructive exhibits illustrating the conditions in ankylostomiasis and bilharzia infection were shown by Dr. Armand Ruffer and by Dr. Sandwith; and Dr. Nabarro showed specimens of trypanosoma from Uganda.

In the section of State medicine the president, Dr. J. S. Haldane, opened a discussion on standards of ventilation, discussing the effect upon the human system of poisonous gases and dust. The dust nuisances he considered could be better prevented by special measures, such as water sprays, than by a general increase of the ventilation. Subsequently he dealt with the effects of breathing air contaminated with an excess of carbonic acid gas, or containing a deficiency of oxygen or an increase of organic matter. The real pathological effects of such conditions, he held, were slight. The discussion was continued by Dr. Jones, Dr. Oliver, Dr. Hay, and others.

Dr. Newman opened a discussion on the control of the milk supply. Having reviewed the dangers to the nation which spring from the present inadequate and contaminated milk supply, he urged that the initiative for reform must come in the first place from the consumer. So far as legislation is concerned, he thought that all that could be expected was a systematic and universal enforcement of the Dairies Order. Dr. Henri de Rothschild agreed with Dr. Newman that the demand for reform must come from the consumer. The chief difficulty appeared to him to lie in the fact that the consumer wanted good milk at a price for which only bad milk could be purchased.

GEOLOGICAL NOTES.

"THE Stone Reefs of Brazil, their Geological and Geographical Relations, with a Chapter on the Coral Reefs," is the title of a memoir by Mr. J. C. Branner (*Bull.* Mus. Comp. Zool. Harvard Coll., vol. xliv., geological series, vol. vii.). These stone reefs form striking features along the Brazilian coast from near Ceará to Porto Seguro; they are formed of sandstone, in places almost a quartzite, and stand flush with the water at high tide, while at low tide they are left exposed like long, low, flat-topped walls. The ports and towns behind these reefs owe their existence to them, as they form natural breakwaters, usually standing across the mouths of streams and estuaries.

In origin they are due to the solidification of beach sands. Coral reefs are now growing over and upon the stone reefs in some places, while at other places there are stone reefs overlying dead coral reefs.

Evidences of great depression and subsequent elevation occurred in late geologic times, and the sandstone reefs were formed when the land had finally risen. The author points out that in a region of concentrated rainfall and long droughts the river mouths had become temporarily closed, and the abundant aquatic and other life in the lagoons thus formed contributed to the organic acids of the waters. These waters, upon penetrating the dam of beach sand, first dissolved the carbonate of lime in it, and re-deposited this as cement when in contact with the dense sea-water on the ocean side. In this manner some portions of the beaches have been hardened, while others have remained incoherent.

In an able article on the modes of occurrence of intrusive rocks, Mr. J. G. Goodchild discusses the question whether they displace or replace the rocks which they invade (*Proc.* Roy. Soc. Edin., xxv., No. 3). He cites and figures